



National Aeronautics and Space Administration

Lyndon B. Johnson Space Center
SPACE CENTER ROUNDUP
Volume 45 • Number 2
FEBRUARY 2006

Roundup



Valentines come in all shapes and sizes, from paper hearts to candlelit dinners—and now stellar nurseries resembling shimmering pink rosebuds. NASA's Spitzer Space Telescope, formerly known as the Space Infrared Telescope Facility, has captured with its infrared eyes a pink and green rose-like picture of a cluster of newborn stars known as a nebula.



New Horizons

The first mission to distant planet Pluto is under way after the successful launch of NASA's New Horizons spacecraft from Cape Canaveral Air Force Station, Fla.

New Horizons roared into the afternoon sky aboard a powerful Atlas V rocket on January 19 at 2 p.m. EST.

The 1,054-pound, piano-sized spacecraft is the fastest ever launched, speeding away from Earth at approximately 36,000 miles per hour, on a trajectory that will take it more than 3 billion miles toward its primary science target. New Horizons will zip past Jupiter for a gravity assist and science studies in February 2007, and conduct the first close-up, in-depth study of Pluto and its moons in summer 2015.

Space Center Roundup

The Roundup is an official publication of the National Aeronautics and Space Administration, Johnson Space Center, Houston, Texas, and is published by the Public Affairs Office for all Space Center employees. The Roundup office is in Bldg. 2, Rm. 166A. The mail code is AP121. Visit our Web site at: <http://www.jsc.nasa.gov/roundup/online/> For distribution questions or to suggest a story idea, please call 281/244-6397 or send an e-mail to roundup@ems.jsc.nasa.gov.

Joanne Hale Editor
Kendra Phipps Assistant Editor
Catherine Borsché and Brad Thomas Staff Writers
Marshall Mellard Graphic Designer

PRSR STD
U.S. POSTAGE
PAID
WEBSTER, TX
Permit No. 39

A VALENTINE
in the sky

FROM THE *director*

A MESSAGE FROM CENTER DIRECTOR MICHAEL L. COATS



Wellness

BEAK'S BODY SHOP is now open for business! The Lt. Gen. Jefferson D. Howell Fitness Facility in the Gilruth Center is just one aspect of the new JSC Exploration Wellness Program.

The wellness program includes not only the 7,000-square-foot state-of-the-art fitness facility, with 36 new pieces of top-of-the-line cardiovascular equipment and new weight-training equipment, but also a professional fitness staff, a dietician, behavior change programs, group exercise classes, and a Web tool for wellness assessment. The renovated men's and women's locker rooms have 300 lockers each and new shower facilities. Beak is justifiably proud of the new fitness facility he sponsored, and we should all take advantage of it as much as possible.

The Exploration Wellness Program is your program, designed to encourage the JSC team to make healthy decisions and take responsibility for its overall well-being. Individual wellness is an important contributor to a safe and highly effective workforce at JSC, but more importantly each and every one of us owes it to our families to take good care of ourselves as much as we take good care of them. I certainly don't mean to lecture, but I speak with the voice of painful experience. For many years after leaving NASA, I devoted increasingly longer hours to work, exercising irregularly at best, and the only healthy meals I enjoyed were Diane's home cooking in between my airline, hotel and fast-food meals on the road. I set a very poor example, and paid the price 15 months ago with a near-fatal heart attack. I was extremely fortunate to survive a "wakeup call" with no permanent damage, and I've learned a lot about heart disease. For example, most first heart attacks are fatal with few if any warnings, and four times as many women die of heart attacks than die from breast cancer.

I'm not proud of the poor example I set, and I regret terribly what my family had to endure, but I say all this in the hopes that you can learn from my experience. Recent research shows that any exercise has significant benefits, and the Exploration Wellness Program and Beak's Body Shop provide all the help anyone could need. Taking care of yourself is something you owe to yourself, and, more importantly, something you owe to your family. I encourage you to make it a priority in your daily activities.

Watch for the March edition of the Roundup, which will feature full coverage of the Starport Fitness Center Grand Opening as well as fitness info.

IT'S A MYSTERY

Out of Africa

by Brad Thomas

What do a rocket, NASA engineers, an African safari guide and an outhouse have in common?

They are involved in a 30-year-old mystery that has come to a close.

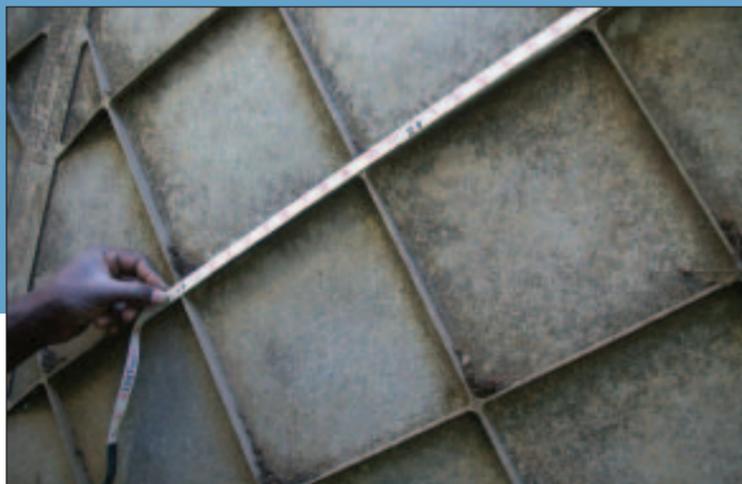
WELL... ALMOST

The mystery began in 1975 when Graham Sheppard was flying doctors to a remote landing strip in western Zambia. Sheppard, accompanied by his then 6-year-old son Ian, saw a piece of metal near an airstrip that caught his eye. According to the Sheppards, the out-of-place piece of metal had numbers, a NASA inscription and "U.S.A." printed on it.

Graham took a picture of the metal with a local man posing next to it when he returned to the site in 1976.

Years later, Graham showed the picture to his younger son, Richard. This sparked Richard's interest in recovering the metal and finding out its origins. Since Richard was an African safari guide in Zambia, he was able to search for the object.

NASA_JSC2006E00737



Richard Sheppard captured a close-up view of the metal he recovered in western Zambia. Sheppard recovered the metal in 2000 and took this photo in 2002. Flight controllers believe the metal is probably debris from the Apollo/Saturn-203 mission, which launched July 5, 1966.

Page 3 photo: A man stands next to the piece of metal that Graham Sheppard and his son Ian first saw in 1975 while transporting missionaries to an airstrip in western Zambia. Graham took this photo when he returned to the airstrip in 1976.

NASA JSC2006E00786

mystery

Following his first failed attempt due to poor road conditions in 1999, Richard resumed his search to locate the metal in 2000. He first went to the West Two Airstrip in Zambia, where his father thought he had seen the metal 24 years earlier.

Just as he was concluding the search at West Two with no results, his fortunes took an abrupt upward turn when he showed the picture to a local woman. She knew the man in the photo and told Richard that the man lived by the West One Airstrip.

Richard went to the West One Airstrip and quickly had success. He discovered the debris in a most unlikely place. “We went down the road,” Richard said, “and it was being used as the roof of a washroom.”

Richard said the metal on the outhouse stood out in the area because the buildings were mostly constructed with mud bricks and thatch. He purchased the metal from the villagers for \$200, which he said was nearly a year’s salary for a villager, and took it back to his ranch.

Unfortunately, all of the identifying marks that appeared on the original piece of metal were gone. The villagers told Richard that many years ago, Europeans had cut off the four-foot by four-foot piece that contained the markings, leaving the remaining piece measuring about 12 feet by 10 feet.

WHERE DID IT COME FROM?

Now that Richard had found the metal, the next step was to determine where it came from.

Richard eventually made contact via e-mail with several people at the Johnson Space Center Astronomical Society. One of those contacted was Chuck Shaw.

Shaw, who is currently serving as mission director for Hubble Space Telescope Servicing Mission 4, said the ensuing investigation involved both current and past flight controllers.

After months of investigating, the group began leaning toward Apollo 6 as the source of the metal debris. Apollo 6 was the final uncrewed test mission prior to NASA’s successful missions to the moon. The mission’s objectives were the final qualification of the Saturn V launch vehicle and Apollo spacecraft for the upcoming crewed lunar flights.

Apollo 6 became a possible source because the Saturn V rocket experienced engine problems on its second-stage burn. The spacecraft did reach its desired orbit, but flight controllers burned the engines longer than planned. The second stage reentered the atmosphere further downrange than planned, placing the potential debris footprint over Zambia.

Richard and Ian traveled to the United States in November 2005 and visited Rocket Park looking for an answer to the metal’s origin by matching the debris to the Saturn V rocket.

A NEW TWIST

However, further investigations in December led to another and more likely source of the debris—the Apollo/Saturn-203 (AS-203) mission.

AS-203 was an uncrewed test flight of the Saturn rocket. It launched from Kennedy Space Center in Florida on July 5, 1966.

“Apollo 6 was looking like a good bet until we discovered that this mission (AS-203) had debris in Zambia,” Shaw said.

According to a list from the Senate Committee on Aeronautical Space Sciences report published in 1972, a piece of metal similar in size to that of the Sheppards’ was found in Zambia in July 1966. It was identified as a piece of the Saturn-IVB stage of AS-203 rocket.

Later that year, another piece was found in Swaziland, also in southern Africa. It was identified as a part of the Saturn-IVB stage of AS-203. To date, Shaw said there is no evidence that Apollo 6 debris has ever hit land.

“We know that the vehicle fragmented early on the fourth orbit,” Shaw said. “They were doing a pressurization check between the ground station at Corpus Christi and Trinidad.”

Shaw said that it was very possible that debris from a rocket launched in 1966 could stay undetected for many years. Another factor pointing to AS-203 is that pieces of the Saturn-IVB stage have the same waffle pattern as the piece found by the Sheppards.

Even though there is a strong case for AS-203, it may not ever be confirmed as the source.

“We will never know for sure,” Shaw said. “But it looks like AS-203 is the source of the debris. It is not unreasonable to think that more than one piece could land there.”

LESSONS LEARNED

Shaw said the efforts to find the source of the metal have been a good experience. “It was gratifying that people around the world hold our accomplishments in such high regard,” Shaw said. “I made a couple of new friends from the other side of the Earth.”

In addition to being fun, he said that his research has inspired him to write the best documentation he can. “It was neat looking back in time. [The Apollo engineers] did a good job at documenting day-to-day activities. It makes me want to do the best job I can in documenting our activities.”

Researching the notes from his predecessors has also given Shaw a better understanding of what went on during NASA’s Apollo missions.

“You can read about the Apollo Program and about all they did,” he said, “but when you read the notes, it brings it to life. It gives you a better appreciation of the challenges they faced.”

As for the current location of the metal debris, Richard shipped it to the United Kingdom, where it is at a friend’s house. Richard is exploring options on what to do with it next.

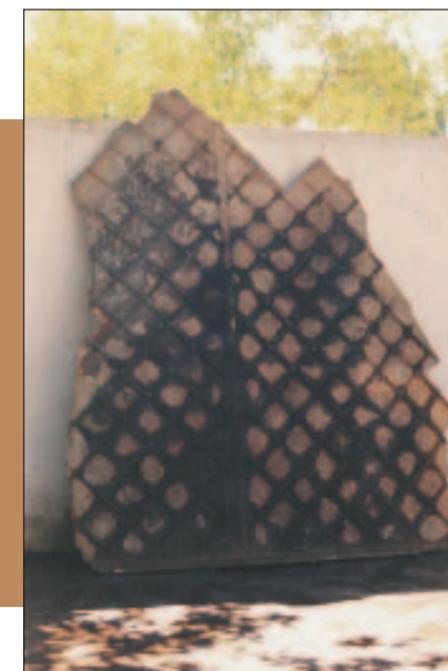
Unfortunately, Graham passed way in August 2005 before his sons could visit JSC and learn about the possibility of the out-of-place object originating from AS-203. The brothers said they continued the quest to discover the origin of metal with their father in mind.

“It was something he was very interested in,” Richard said. “He was very fascinated with the space program. It was a tribute to him.”

“It is like coming full circle,” Ian said.

“Apollo 6 was looking like a good bet until we discovered that this mission (AS-203) had debris in Zambia.”

The metal debris stands up against a wall at Richard Sheppard’s lodge in Zambia. Sheppard recovered the debris in 2000 and took this photo in 2002. The metal measures about 12 feet by 10 feet.



NASA JSC2006E00788

What I about JSC



NASA/Bair JSC2006E01019

I love the “campus” look of JSC. I love the way folks work to get along with all the other creatures that live here. I love the fact that hard-core engineers and scientists are still enthralled, with an almost childish delight, by the things that are accomplished here on a daily basis.

Judi Mayes
Staff Technical Support Specialist
Barrios Technology



NASA/Bair JSC2006E010604

I love the fact that unlike most of what we call the “real world,” people at JSC are here because they want to be. Because they believe in, love and want to be a part of human spaceflight, at the only human spaceflight center in the world outside of Moscow and now Beijing. Many could work in other places. Many would prefer to live in other cities, but they choose to be here because they share a dream of exploration and love to share that dream with those around them.

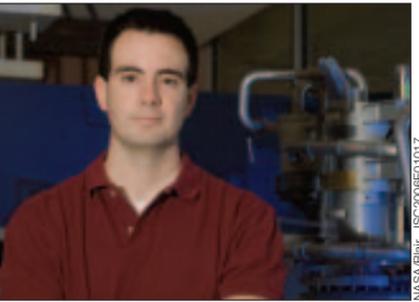
Michael Lutomski
Risk Manager
NASA



NASA/Bair JSC2006E010118

I love the passion that people have for their work. I feel like I am part of something bigger than myself and have the opportunity to do something that makes Americans proud.

Elizabeth Blome
Space Station System Integrator
NASA



NASA/Bair JSC2006E01017

I love that there is always more to learn when working at JSC, no matter who you are. If you are willing to just sit back and listen for a while, you’ll learn amazing things from some of the most intelligent and creative people in the world.

Ken Stroud
Space Human Factors Analyst
NASA

I love JSC because it still evokes emotions working here even after over 22 years.

Richard Lehman
Space Station Software Safety & Mission Assurance
Science Applications International Corporation

I love our lawn ornaments. They remind us where we’ve been and where we want to go.

Ken Jenks
Engineer
NASA

I love that each part done by everyone here at JSC makes a mission complete! Our commitment to mission success unifies us. Few things are more awesome than watching the ignition of grumbling gases within the shuttle’s engines and hearing my coworkers cheer after...“3, 2, 1...liftoff!”

L. Therese Ramirez
Customer Service, JSC Locksmith Shop
Diamond Group

I love the fact that even though there are a lot of different companies and separate groups working at JSC, you still feel like you are part of a large family interested in the space program.

Brenda Voisine
Print Shop Customer Service
GeoControl Systems, Inc.

I love JSC’s historical significance in the adventure of human spaceflight, and the fact that it continues to play a major role in our present and future missions. We have good people, a beautiful setting and exciting work. How can you not love it here?

Silvia Molano
Human Resources Staffing Specialist
NASA

Unquestionably, it’s the people! We have some of the brightest, funniest and most caring people you could ever find in one collection, and we’re as diversified as the world itself. I love JSC for its heart and spirit.

Mary Peterson
Writer/Editor
MEI Technologies

I love the free-ranging deer, native birds, and, in the spring, the new patch of wildflowers and bluebonnets that all grace the spacious landscape of JSC.

Maria J. Hooks
Contract Specialist
NASA

This morning my wife said she’s leaving me. My kids wouldn’t give me kisses and hugs. My best friend died. My dog bit me. But today I get to come to the Johnson Space Center and play with the astronauts. I don’t just love this job; I live for it!

Tom Hanson
Team Lead, Space Shuttle Training Division
Barrios Technology

This is a dream. I wake up...Drive to work passing beautiful lakes full of boats and people enjoying themselves...Pass by the smiling security guards...I’m surrounded by intelligent people who are also my friends...Walk outside in the most beautiful 60-degree weather and admire the pond where all the little critters enjoy life...I go home feeling fulfilled... Wait a minute! The only part that is a dream is the 60-degree weather. Other than that, it’s a typical day at JSC. We are all so lucky!

Heather Boudreaux
Medical Records Receptionist
Kelsey-Seybold

What I love about JSC is the enthusiasm and inspiration JSC employees have for the space program. It’s important to commit yourself to something you believe in, and I am surrounded every day by people who work to make dreams come true and the unbelievable a reality.

Jenna C. Mills
Public Affairs Specialist
NASA

I love the incredible people I get to work with on a daily basis. My coworkers are creative, talented, dedicated and truly want to make NASA the best it can be. In addition to being professional and hardworking, my coworkers are also my best friends.

Tiffany Travis
Media Outreach Team Lead
Tessada & Associates, Inc.
JIMMS Contract

What I love about JSC is all of the animals—the deer, ducks, squirrels, birds and pigeons. This makes JSC more than a place for us humans to work with each other; it’s a chance to work and live among other amazing creatures.

Jessica Madrigal
Flight Program Support Branch
REDE/Critique

I love that there is a wealth of knowledge here. I love the diverse culture and that the Vision for Space Exploration is far-reaching. I love that there are no boundaries, but only limits that we ourselves impose. I love that we have exceeded our own expectations.

Oretta Cade
Secretary, Program Integration Office
REDE/Critique

(In the style of a Robert Frost verse)
When dreams lead “man” towards exploring the universe,
JSC reminds me, I have no limitations
When patriotism and honor is a test of “man’s” courage,
JSC reminds me, of that richness and diversity of existence
When dreams are realized,
JSC reminds me, I can touch the stars

Linda Kennedy
Publicist
United Space Alliance

The people! What a fantastic group of folks. Every day I’m impressed with the professionalism and dedication of the workforce at JSC. We are truly a team working towards a common mission, and I’m honored to be a part of it all.

Susan White
Acting Manager, Human Resources Development Office
NASA

I love the spirit and excitement obvious in faces when we accomplish great things together—for our great nation foremost, but also for the entire planet. But I also treasure the closeness of a true family when we do have those very bad days and need each other for support.

Richard Guidry
Payload Safety Engineer
NASA



It may not have been Orville Wright's first flight, but to Paul Dye, a lead flight director of Space Shuttle Operations, the moment was filled with the same kind of magic.

A 'bird' of a different feather

by Catherine E. Borsché

On Oct. 9, Dye took his home-built, kit airplane for its first spin around Houston-area skies. This plane, the RV-8, is a favorite among aviators due to its nimble flying and handling qualities. The flight in the RV-8 was not a disappointment, as Dye said that it flew like "a scalded cat."

"It was an exciting morning, with lots of first-flight jitters, but in the end, everything worked out," Dye said. "[Astronaut] John Young [the first person

to fly in space six times from Earth] once said, 'if you're not a little nervous before taking up a new aircraft, you obviously don't understand what you're doing.'"

Flying an aircraft that Dye built with his own hands was the culmination of a very early childhood dream.

"Well, according to my mother, I said my first word when I looked up at a plane in the sky, pointed, and said 'airpoo.' So I guess I've always had a fascination for planes," Dye said.

A self-proclaimed "hangar rat," Dye tinkered on airplanes as a kid and started flying at the age of 13. Although he always imagined he would be working on airplanes as a career, his life's path led him to NASA. Now, as lead flight director, his job requires him to get even bigger "birds" up in the air.

A lot of blood, sweat and tears goes into making an airplane from the nuts-and-bolts beginning. As Dye indicated, he will no longer be showing up to work "with scraped and scarred hands from working with aluminum every night." Dye spent over a year assembling the various kits to form the skeleton of the plane. After that, there was still the task of finding an engine and the electronics to complement the entire system.



Paul Dye, a lead flight director of Space Shuttle Operations, next to the RV-8 kit plane he built from scratch.



Paul Dye's RV-8 aircraft gets ready to take off for the first time.

"Even though there's a kit for the airplane, no two are ever alike," Dye said. "This airplane is a favorite because it is so close to an ideal of what an airplane should be. It is an exceptionally fine flying machine."

Building the RV-8 has also allowed Dye to share his passion with co-operative education (co-op) students at NASA.

"I frequently give presentations to co-ops each semester on my career at NASA. Last spring, I was asked about the airplane project, which was in my garage, and before I knew it, I had 40 co-ops coming over to check it out," Dye said.

That visit only opened the floodgates to more sharing.

"This fall, when I mentioned it at my presentation, I had several students volunteer to help in the Flight Test Program," Dye said. "Thinking back to my own school days as an aeronautical engineering student, I realized that I would have killed to be involved in a real-world Flight Test Program, so I enthusiastically invited them aboard."

The Federal Aviation Administration (FAA) is the government agency primarily responsible for the advancement, safety and regulation of civil aviation. Once the plane's construction was complete, the FAA awarded the craft an Experimental Airworthiness Certificate. With this designation, Dye's plane could undergo flight testing to certify it for normal service.

During the flight test period, Dye and the co-ops met every couple of weeks and had brown-bag lunches together. In addition, they went to the airport with Dye to help gather flight measurements. As Dye flew test flights, the co-ops recorded the data and helped produce test flight results.

"It was a great collaborative effort, and I think I enjoyed teaching them the process as much as they enjoyed learning," Dye said.

Now that the aircraft is complete, all that it is lacking is a custom paint job, which Dye is hesitant to do soon since it means he won't be able to fly it during that time.

Getting his own "bird" off the ground, to Dye, was an emotional experience that rivaled his participation with the ascent entry team during the launch of STS-26, the first shuttle flight after *Challenger*.

"This has been a project beyond description—building and flying my own airplane, after all the years I have put into aviation," Dye said. "Words fail me."



View of the cockpit inside the RV-8.

...I said my first word when I looked up at a plane in the sky...

Fueling the fire

by Kendra Phipps

It's got to be hard to spend years toiling over a project and then watch it plummet into flames. Oddly enough, that represents a good day for thousands of External Tank Project Office employees.

When a space shuttle external tank disintegrates in the atmosphere during reentry, that means that it has done its job of supplying the shuttle propulsion system with fuel and helping the spacecraft reach orbit. Its work is finished.

Not so for the tank project employees at Marshall Space Flight Center in Huntsville, Ala., and at the Michoud Assembly Facility in New Orleans. Their work continues before, during and after each shuttle launch—building, processing and testing a nearly constant cycle of external tanks.

"It takes hundreds of thousands of man-hours to process a single tank," said Steve Holmes. Holmes is the team lead for the project office's materials group. He said that Michoud is capable of processing about 12 tanks at a time. The facility, operated by prime contractor Lockheed Martin, used to deliver around six tanks per year, with each tank taking two years to go through the entire process.

Though the revolving door of tanks has slowed recently—tank elements were improved and adjusted following the *Columbia* accident, and more adjustments are currently being considered—the teams continue to give their all.

The checklist for processing a tank for spaceflight would be nearly as long as the 154-foot tank itself. An external tank has three major elements: the oxygen tank, the hydrogen tank and the collar-like intertank connecting them. All three components require lots of attention before the whole thing can be shipped to Kennedy Space Center (KSC) for launch.

Some of the processing steps include:

- welding the hydrogen and oxygen tanks, then testing to make sure they can handle the pressure loads
- cleaning the inside and the outside of the hydrogen and oxygen tanks
- applying a corrosion-inhibiting primer
- automatically spraying foam onto the intertank, then machining the entire corrugated structure to achieve a minimized weight while meeting heat protection requirements

Even after the tank is processed and shipped to KSC, the work still isn't done for the tank office. Holmes describes the time surrounding a launch as "exciting but hectic" as final checkouts are performed and Flight Readiness Reviews are conducted. During "tanking," when the tank is filled with 535,000 gallons of liquid hydrogen and oxygen, team members are monitoring valves, heaters and hazardous gas levels and watching for ice formation or any unexpected problems. Then during the launch itself, a close eye is kept on pressurization systems and possible debris during ascent.

Workers at Marshall, Michoud and Johnson Space Center all collaborate on these observations to ensure that nothing is overlooked.

"That's what we have to do; every launch is different," Holmes said. "Some of them, you have absolutely no problems and everything's

fine; other times you have cracks or ice that you have to go work on."

The process of manufacturing and monitoring an external tank is intricate enough on its own; adding a hurricane or two only complicates things further. Many of Michoud's 2,000 employees were displaced by Hurricane Katrina, and the facility was isolated by floodwater and debris for several days. Michoud also sustained roof damage, a power outage and additional minor damage from Hurricane Rita.

Despite the upheaval of losing their homes, Holmes said that employees continue to push forward in support of future shuttle missions.

"At times, there's a sense of being overwhelmed with all this," he said, "but on the other hand, sometimes it's beneficial to come to work and get their minds on something else."

Associate Administrator for Space Operations Bill Gerstenmaier also praised the resolve of the employees.

"Workers at Michoud have just done a phenomenal job," Gerstenmaier said. "They've shown tremendous dedication and a tremendous desire to show up to work to help us out."

About 90 percent of the Michoud workforce was back on the job as of early November. Efforts are being made to ensure that the workforce is not overburdened during this understandably stressful time, Holmes said.

Amid all the technical tank checklists and weather-induced drama, Holmes had no trouble defining his favorite part of working with the external tank office.

"By far, the people at Marshall and at Michoud are the best part," he said. "There's not a better bunch of people anywhere."

For more information on space shuttle external tanks, go to:

http://www.nasa.gov/returntoflight/system/system_ET.html

quick facts

The external tank is 27.6 feet wide and 154 feet tall—34 feet longer than the distance of Orville Wright's first flight in 1903. Despite its size, the aluminum skin of the tank is only an eighth of an inch thick in most areas.

The tank is the only component of the space shuttle that is not reused. It is jettisoned approximately 8.5 minutes into the flight.

The combined volume of the external tank's liquid hydrogen and liquid oxygen tanks is 73,600 cubic feet—equal to the volume of nearly six 1,600-square-foot homes.

If all the weld joints in the external tank were laid out in a straight line, they would stretch more than half a mile.

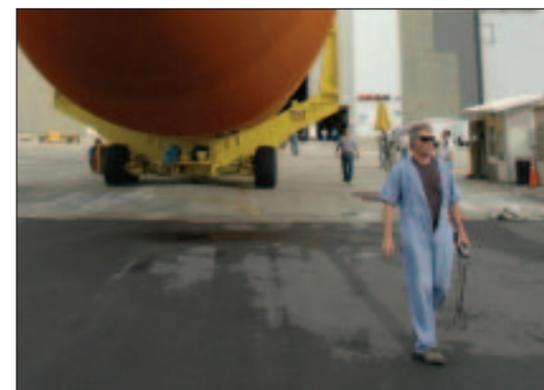
If the foam insulation covering the external tank were spread on the ground, it would cover nearly half an acre.

Empty, the external tank weighs 78,100 pounds; full, it weighs about 1.6 million pounds.

One of the fuels contained in the external tank, liquefied hydrogen, is the second coldest liquid on Earth at -423 degrees Fahrenheit.

Inside the Vehicle Assembly Building, the redesigned external tank used on Return to Flight mission STS-114 waits in the transfer aisle after its move from the barge in the Launch Complex 39 Area Turn Basin.

NASA JSC2005E00902



External tank #120 moves out of NASA Kennedy Space Center's Vehicle Assembly Building (behind it).

KSC-08PD-2330